Cole Jarman

Dearne Hall Road, Barnsley – Barratt and DWH

Garden Noise Assessment

Report 14/0561/R01

Dearne Hall Road, Barnsley – Barratt and DWH

Garden Noise Assessment

Report 14/0561/R01

Barratt Homes & David Wilson Homes – Yorkshire West

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1	1st Issue	16 December 2014	Matthew Heyes	Chris Goff

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1 Introduction

1.1 Planning permission is being sought for a new residential development at Dearne Hall Road, Barnsley.

1.2 Noise limits within gardens and residential dwellings from electrical substation noise are provided within our original noise assessment report. An assessment has previously been conducted on an example housing layout which demonstrated that by using the proposed houses as an acoustic barrier the noise limits within gardens can be achieved.

1.3 A detailed Masterplan for the site has now been prepared which uses the houses as an acoustic barrier. Cole Jarman have been asked to update our noise assessment to establish if the garden noise limits will be achieved and if not, what mitigation options can be utilised to meet the limits.

1.4 This report provides details of the updated noise assessment and provides details of mitigation measures, where required, to meet the garden noise limits.

2 Site Description and Proposed Development

2.1 General

2.1.1 The proposed development site comprises approximately 10ha of arable land located to the south east of Dearne Hall Road, Barnsley.

2.1.2 To the north west of the site are existing residential properties located on Dearne Hall Road (B6428). Running along the eastern boundary of the site is a railway line and beyond that is more farm land.

2.1.3 To the south east of the site is an electrical substation. To the south is an industrial area which includes a distribution centre, MOT garage and car sales yard. To the west of the site are dwellings located on the A637.

2.2 Existing Noise Sources

2.2.1 The general noise climate across the site is dominated by road traffic noise from cars on local roads. Noise from the industrial area is noticeable close to the southern boundary of the site, and occasional trains influence noise levels on the eastern boundary of the site.

2.2.2 Low frequency noise from the electrical substation is also clearly audible within the south eastern section of the proposed development site.

2.3 Proposed Development

2.3.1 It is proposed to build on around 5ha of the overall site. The development will be located primarily towards the north and western side of the site with dedicated habitat and open space along the railway line on the eastern boundary of the site.

2.3.2 The proposed Masterplan for the scheme is shown in Appendix B.

2.3.3 The layout of the Masterplan has been chosen in order to maximise the acoustic screening between the substation and the gardens.

3 Planning Guidance

3.1 Full details of suitable guidance for noise levels within dwellings and gardens across the site have been provided within our previous planning noise assessment report ref 13/0190/R1. The External Low Frequency Noise Criteria provided within this report is repeated below for ease of reference.

"Where external amenity areas are concerned the design goal in the case of general noise sources is to develop a noise control strategy to ensure that within each garden there is provision for an area subject to noise levels of 55 dB $L_{Aeq,\ 16h}$ or less. The corresponding design goal in the case of substation noise is to be 54 dB $L_{eq,\ 5min}$ as a non-weighted 100Hz centre frequency noise level."

3.2 The aim of this report is to demonstrate that the 100Hz noise level from substation noise will be equal to or below 54 dB $L_{eq,\ 5min}$ as a non-weighted 100Hz centre frequency noise level.

4 Noise Survey

4.1 A part attended, part unattended noise survey has previously been conducted around the site. Details of this noise survey and results can be found in the previous Noise Assessment report reference 13/0190/R1; this can be found in attached Appendix A.

5 Noise Modelling

5.1 An acoustic model has previously been created using a computer based noise prediction program (Wölfel IMMI version 2011-1). This has been used to determine the free field noise levels across the site generated by the substation, with and without the previously proposed houses. Full details of this can be found in our Noise Assessment report reference 13/0190/R1; this can be found in attached Appendix A.

5.2 The model was verified by checking the calculated noise levels at the measurement positions located on the proposed site against the measurements taken at those positions. The worst case

on site measurement positions (where constructive interference appears to be evident) have been used for this purpose, to ensure as robust an assessment as possible.

5.3 The acoustic model has been updated to include the housing layout shown in the updated Masterplan as shown in attached Appendix B.

5.4 Analysis of the results from the model has shown that a 2m high acoustic barrier is required along the eastern boundary of the garden of plot 81. The location of the barrier is shown on attached figure 14/0651/F1. The barrier must be constructed in accordance with the details shown in attached specification 14/0651/SPC1.

5.5 The attached noise contour 14/0561/NC1 shows the calculated noise levels within gardens with the noise barrier detailed above in place. The contour shows that with the barrier installed the required garden noise levels will be achieved within all gardens.

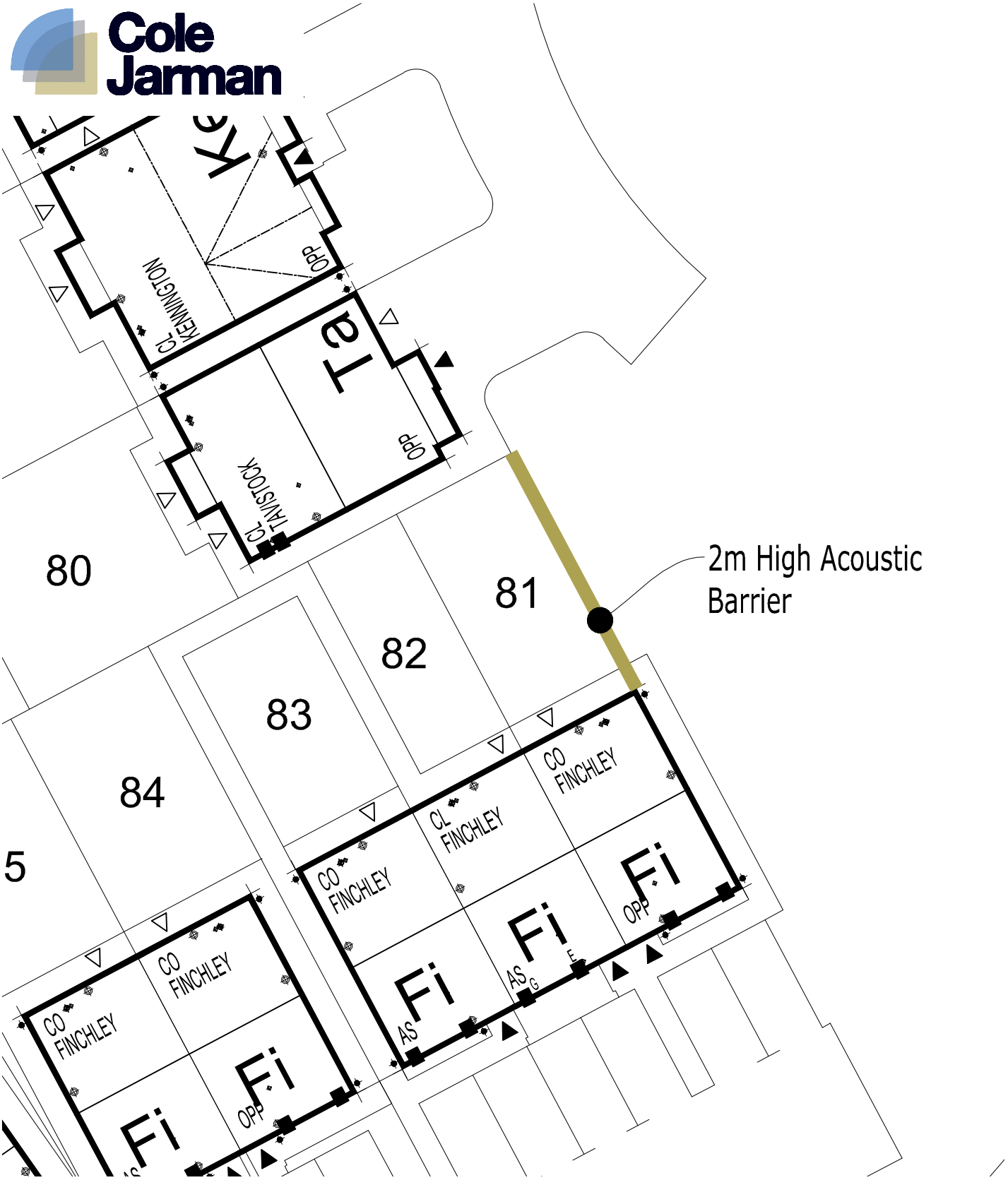
6 Conclusion

6.1 Planning permission is being sought for a new residential development at Dearne Hall Road, Barnsley.

6.2 Noise limits within gardens and residential dwellings from electrical substation noise are provided within our original noise assessment report. An updated Masterplan for the development has been produced and the noise levels from the electrical substation within the proposed gardens have been calculated.

6.3 The assessment has shown that with the proposed layout of the houses acting as an acoustic screen, along with a 2m high acoustic barrier installed along the eastern boundary of plot 81, the garden noise limits will be achieved. Full details of the location of this barrier and its required construction have been provided within this report.

End of Section



Title: Figure showing proposed acoustic barrier location

Figure 14/0561/F1

Project: Dearne Hall Road

Date: December 2014 Revision: 0

Scale: Not to scale

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Specification 14/0561/SPC1

Project: **Dearne Hall Road, Barnsley – Barratt Homes and DWH**
Subject: **Acoustic Barrier**
Date: **15 December 2014**

1 General

1.1 This specification defines the applicable requirements for an acoustic barrier, in addition to the applicable requirements for mineral fibre lining to the acoustic barrier. The suppliers of the materials shall provide the necessary information and data to verify the required performance.

1.2 The supplier shall be responsible for ensuring that all the performance criteria set out herein are met by the product being offered.

2 Barrier Specification

2.1 Barrier height shall be 2m above local ground level.

2.2 Barrier alignments shall be within ± 1.0m of that as shown on figure 14/0561/F1.

2.3 Minimum extents of the barrier shall be as shown on attached figure 14/0561/F1.

2.4 Barriers shall achieve a minimum of 10 kg/m^2 uniform mass per unit area over the full area of the barrier and for the duration of its design life.

2.5 Barriers shall be of imperforate construction over their full areas and remain so for the design life of the barrier. It is essential, especially for barriers with butting or overlapping components, that the joints are well sealed to prevent leakage. This should be achieved without compromising the overall density requirement. Gravel boards of equivalent density are to be used to prevent gaps between screen structure and ground if necessary).

2.6 The barrier structure is to be suitably designed and engineered with appropriate consideration for wind loading and aerodynamic forces.

2.7 No major maintenance should be required for the barriers for 20 years and each barrier should remain serviceable for at least 40 years.

3 Acoustic Barrier Suppliers

3.1 **Buffalo Fence Limited**

- Address
  Church Lane
  Ipsden
  Wallingford
  Oxon
  OX10 6BS
- Telephone 01491 838368
- Fax 01491 825418
- www.buffalo-fence.co.uk

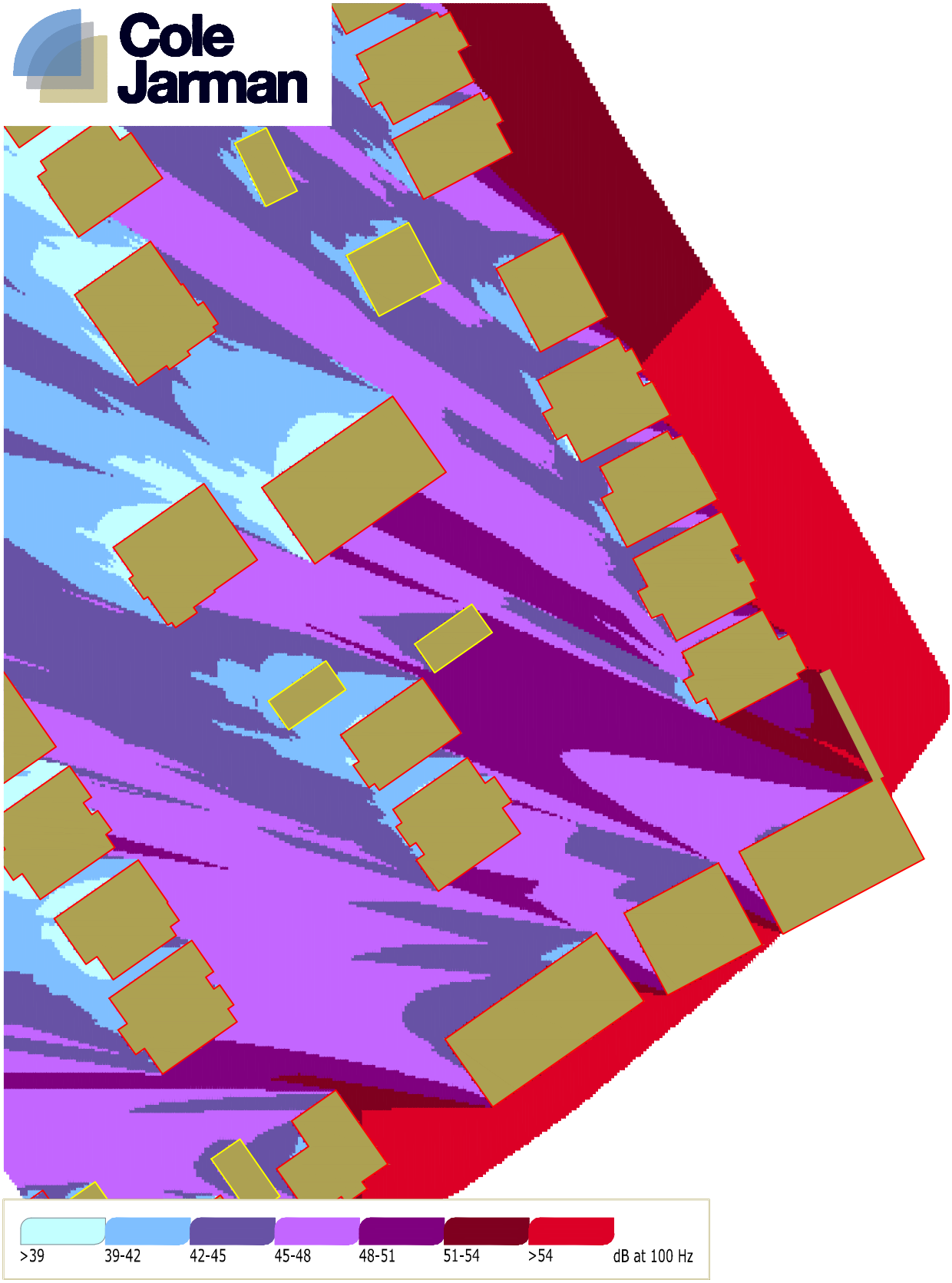
3.2 **Jacksons Fencing**

- Address
  Stowting Common
  Ashford
  Kent
  TN25 6BN
- Telephone 0800 408 2234
- Fax 01233 750403
- http://www.jacksons-fencing.co.uk/

3.3 **Newton and Frost Fencing Ltd**

- Address
  Downsview Yard
  North Corner
  Horam
  East Sussex
  TN21 9HJ
- Telephone 01435 813 535
- Fax 01435 813 687
- http://www.nffltd.co.uk

End of Section



Title: 100Hz Noise levels within gardens close to substation

Figure 14/0561/NC1

Project: Dearne Hall Road

Date: December 2014 Revision: 0

Scale: Not to scale

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Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

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Appendix A

Cole Jarman

Dearne Hall Road, Barnsley

Planning Noise Assessment

Report 13/0190/R1 // REVISION 6

Dearne Hall Road, Barnsley

Planning Noise Assessment

Report 13/0190/R1 // REVISION 6

Commercial Estates Projects

The Exchange
1st Floor
Station Parade
Harrogate
HG1 1TS

Hallam Land Management

Banner Cross Hall
Ecclesall Road South
Sheffield
S11 9PD

Description	Date	Prepared by	Checked by
Revision 6	13 June 2013	Matthew Heyes	Tom Zarebski

Prepared by

Checked by

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Table of Contents 13 June 2013

Attachments

1 Introduction

1.1 It is proposed to develop the land at Dearne Hall Road, Barnsley into a new residential development. The site is located next to an existing electrical substation, an industrial estate, a railway line and local roads.

1.2 Cole Jarman have been instructed to conduct a noise survey at the site in order to establish the existing noise levels.

1.3 This report provides details of the noise survey conducted at the site and provides suitable guidance on the assessment of low frequency noise generated by the substation. The report then details the calculated low frequency noise levels within the proposed houses and garden spaces and compares them to suitable standards to see if the low frequency noise should be considered to be an issue.

1.4 We have also assessed the noise impact from other noise sources which are audible around the site and followed guidance provided in the NPPF and BS8233 to establish suitable internal and external noise limits. Performance requirements for the glazing and ventilation have been specified which will allow the internal noise requirements to be achieved.

2 Site Description and Proposed Development

2.1 General

2.1.1 The proposed development site comprises approximately 10ha of arable land located to the south east of Dearne Hall Road, Barnsley.

2.1.2 To the north west of the site are existing residential properties located on Dearne Hall Road (B6428). Running along the eastern boundary of the site is a railway line and beyond that is more farm land.

2.1.3 To the south east of the site is an electrical substation. To the south is an industrial area which includes a distribution centre, MOT garage and car sales yard. To the west of the site are dwellings located on the A637.

2.2 Existing Noise Sources

2.2.1 The general noise climate across the site is dominated by road traffic noise from cars on local roads. Noise from the industrial area is noticeable close to the southern boundary of the site, and occasional trains influence noise levels on the eastern boundary of the site.

2.2.2 Low frequency noise from the electrical substation is also clearly audible within the south eastern section of the proposed development site.

2.3 Proposed Development

2.3.1 It is proposed to build on around 5ha of the overall site. The development will be located primarily towards the north and western side of the site with dedicated habitat and open space along the railway line on the eastern boundary of the site.

3 Planning and Noise

3.1 National Planning Policy Framework

3.1.1 The National Planning Policy Framework (NPPF) replaces much of what previously existed with regard to planning guidance, including PPG24: Planning and Noise. The NPPF is now the relevant document for defining the national policy toward noise sensitive development. It refers to the Noise Policy Statement for England (NPSE).

3.1.2 PPG24 permitted noise sensitive development in areas subject to low levels of environmental noise while discouraging noise sensitive development in areas subject to high levels of environmental noise. The current policy on sustainable development can be considered as subtly altering the emphasis. The development of a quiet, rural site is by most measures less sustainable than the development of a busy, urban site and the rating of development sites based on prevailing noise levels should now reflect this.

3.1.3 Specifically on the subject of noise, paragraph 123 of NPPF states:

Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing business wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established, and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.1.4 Paragraph 123 references to the Noise Policy Statement for England, and no other particular standards.

3.1.5 On the general issue of amenity, paragraph 17 states that planning should:

Always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings

3.2 Noise Policy Statement for England

3.2.1 This document does not set quantitative guidelines for the suitability of noise sensitive development in an area depending on the prevailing levels of noise. Absent, therefore, is reference to specific noise thresholds (e.g. the Noise Exposure Categories as defined in PPG 24) which determine whether noise sensitive development is suitable and, if so, whether particular mitigation factors need to be considered.

3.2.2 Instead, the NPSE sets out three aims:

The first aim of the Noise Policy Statement for England

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The second aim of the Noise Policy Statement for England

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The third aim of the Noise Policy Statement for England

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

3.2.3 In essence, therefore, each development site must be judged on its ability to deliver on each of these aims, and while rating the prevailing noise against predefined thresholds is no longer necessary, defining the prevailing noise levels is an essential first step in assessing a given site under the current regime.

3.3 Planning Guidance PPG24 (Revoked)

3.3.1 As noted above, DoE document Planning Policy Guidance 24: Planning and Noise is no longer used to determine the suitability or otherwise of a given site for noise sensitive development.

3.3.2 However, reference documents cited in PPG 24 do have some relevance in developing policies for local authorities. We refer to these below.

3.3.3 In PPG 24 there were certain sound level thresholds above which it was recommended that planning permission be refused for residential use. These thresholds were derived on the basis that it is necessary to achieve acceptable internal noise levels, together with a fundamental assumption was that there existed a maximum level of sound insulation which was achievable against external noise.

3.3.4 The maximum level of sound insulation that was applied to derive the external noise thresholds set out in PPG 24 was based on the technology then available for upgrading existing properties. Even at the time of its publication, new properties that incorporated higher standards of insulation were able to be developed. In addition, since then there have been developments in sound insulating products, meaning that it is feasible to design buildings that achieve good standards of internal amenity even when external noise levels are high.

3.4 Internal Noise

3.4.1 Buildings can be designed to achieve specific levels of insulation against external noise. It is reasonable, therefore, to set specific internal noise standards as the test of whether a development satisfies the requirements of the NPPF and the aims of the NPSE. In essence, these require a high quality design that achieves a good standard of amenity.

3.4.2 In Annex 6 to PPG 24 it states:

Guidance on suitable internal noise levels can be found in BS8233:1987.

3.4.3 This standard was updated in 1999, guidance in respect of indoor ambient noise levels is contained in Table 5 of the standard and tabulated below.

Typical situations	**Design Range $L_{Aeq,T}$ dB**	
	Good	**Reasonable**
Living rooms	30	40
Bedrooms[a]	30	35

T2 Target design indoor ambient noise levels for new dwellings

[a] For a reasonable standard in bedrooms at night, individual noise events (measured with F time weighting) should not normally exceed 45dBL_{Amax}.

3.4.4 The above design standards apply to the time period appropriate for the activity involved. The WHO document[1] on which the standards are based, identifies that the daytime noise standard applies to a normal 16 hour day while the night time noise standard applies to an 8 hour night. In BS8233 the daytime period is defined as being between 0700 and 2300 hours and the night time period as between 2300 to 0700 hours.

[1] World Health Organisation: Guidelines for Community Noise, Berglund et al. 1999

3.4.5 A high quality design that achieves a good standard of internal amenity will ensure that night time noise levels inside bedrooms with windows closed will not exceed 30dB $L_{Aeq,8h}$. The level of sound insulation achieved by the building shall be determined accordingly.

3.4.6 With respect to night-time L_{Amax} noise levels, a High Court Ruling in 1996 on an appeal against the Secretary of State for the Environment clarified the point that "several times in any hour" should be interpreted as "more than two in any hour". The WHO study derived the 45dB $L_{Amax,F}$ night time noise standard on the basis of 10 to 15 occurrences per night.

3.4.7 On this basis the aim shall be to ensure that $L_{Amax,F}$ values for **typical** intermittent noise events, rather than occasional or one-off noise events, shall not exceed 45dB in bedrooms.

3.4.8 To achieve 'good' internal noise levels as set out in BS8233 would require designing to the same average noise levels of 30dB $L_{Aeq,T}$ in both the daytime and night time periods. Clearly people are more sensitive to noise intrusion during the night time than the daytime. For this reason the following noise limits are proposed:

Daytime $L_{Aeq,16h}$ to all habitable rooms no greater than 35 dB.
Night time $L_{Aeq,8h}$ to all bedrooms no greater than 30 dB.
Night time typical L_{Amax} to all bedrooms not normally greater than 45 dB (excluding atypical events).

3.4.9 These noise levels represent 'good' night time noise levels, and a sensible compromise between 'good' and 'reasonable' during the daytime.

3.5 DEFRA NANR 45: Procedure for Assessment of Low Frequency Noise

3.5.1 Attached Appendix A outlines a procedure for the assessment of low frequency noise, as set out under contract number NANR 45 for the Department of Environment, Food and Rural Affairs (DEFRA). The procedure is intended for use where complaints have been received about an existing low frequency noise, in order to identify whether the noise is present within a dwelling at a level that could reasonably give rise to disturbance to some individuals. It does not necessarily follow that the presence of the noise at such a level will in fact give rise to disturbance.

3.5.2 Although the DEFRA document states that the procedure would not be reliable if used to predict the likelihood of complaints at the planning stage, when the noise source and receptors are often not yet present, we believe that it represents a good means of indicating whether a low frequency problem may exist.

3.5.3 The DEFRA standard is only applicable to internal noise levels within dwellings. Due to this the performance of the building façade and ventilation system can be used to reduce the noise levels to below the DEFRA curve.

3.5.4 We have therefore applied the procedure in the case of the existing electrical substation and proposed residences, in order to provide some guidance on whether low frequency noise is likely to be present at a level which could disturb some individuals. Although not specifically

designed for this use we consider the DEFRA guidance to constitute the best available guidance to fully take the low frequency content of the substation into account. We have therefore based our advice on a cautious but informative interpretation of the results.

3.5.5 The procedure includes a criterion curve, which can be relaxed for the daytime period and also for less intrusive steady noise sources. The existing substation falls within the definition of a steady noise source, as set out in Appendix A. The criterion curves for steady noise sources have therefore been used. This results in an internal criterion of 48 dB during the day and 43 dB at night (specifically for the 100 Hz one-third octave band, which represents the dominant frequency band of the electrical substation noise).

3.6 External Noise Criteria

3.6.1 External areas cannot, by definition, be contained or benefit from the levels of noise mitigation that are available to internal spaces within buildings. As a consequence, design standards for external noise cannot be considered as thresholds that determine whether a high quality design has been implemented and a good level of amenity achieved. Rather, the external noise standards should be used to establish whether mitigation is appropriate as a means of minimising the adverse impacts of environmental noise.

3.6.2 Paragraph 7.6.1.2 of BS8233:1999 indicates that in external amenity spaces the steady noise levels should not exceed 50dB $L_{Aeq,T}$ and 55dB $L_{Aeq,T}$ should be regarded as an upper limit.

3.6.3 A new, updated version of BS8233 is currently in draft stage. Regarding garden noise limits the following statement has been added:

" … it is also recognized that these limits are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres, a compromise between elevated noise levels and the convenience of living in these locations is warranted. Where this situation occurs, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

3.6.4 While it should be noted that the revised standard is in draft stage and has not as yet been formally accepted, it can be seen that external noise levels are not proposed to be a controlling index by which suitability of a residential site is defined.

3.6.5 Therefore, when designing noise sensitive developments that incorporate gardens or other external amenity areas, the intent shall be to provide an area for each property in which the noise levels are consistent with these standards. Where these standards cannot be achieved, then reasonable measures shall be employed to provide screening or other forms of mitigation so as to minimise the noise levels in the external amenity areas.

3.6.6 An important principle here is that sustainable development sites will often be exposed to relatively high levels of environmental noise, and while means are available to insulate internal spaces, they are not always available to protect external spaces. This is why the external standards shall be viewed as targets or triggers of mitigation measures rather than thresholds not to be exceeded in all circumstances.

3.6.7 Strict adherence to the enforcement of such external noise criteria would preclude development in the majority of areas considered for development in semi-urban or urban environments or in areas in the vicinity of transportation noise sources.

3.6.8 This further demonstrates why the external noise standards should be viewed as aspirational targets or triggers of mitigation measures rather than thresholds not to be exceeded in all circumstances.

General Noise Events of Short Duration

3.6.9 Maximum noise level exposure is normally examined to protect against sleep disturbance. On this basis WHO and BS8233 guidelines do not provide maximum noise limits for external areas during the day as they are not considered to be of concern compared to the ambient noise levels.

3.6.10 To provide some context external maximum noise levels were considered within the revoked PPG24. The section which deals with this is repeated below:

"Night-time noise levels (23.00 – 07.00): sites where individual noise events regularly exceed 82 dB $L_{Amax,8h}$ (S time weighting) several times in any hour should be treated as being NEX C, regardless of the $L_{Aeq,8h}$.".

3.6.11 As can be seen from the quote above maximum noise levels are only considered at night and are only considered to be an issue above 82 dB L_{Amax}.

Low Frequency Noise

3.6.12 There are no established guidelines for setting absolute noise limits for low frequency noise exposure in external amenity spaces.

3.6.13 It is however known that low frequency noise levels generated by power transformers do not need to be inaudible to be acceptable to local residents. Reference is made to 100Hz low frequency transformer noise by Cyril M Harris in his 'Handbook of Noise Control' as follows:

The acceptable sound level depends on the background noise level, but generally (in the open air), an A-weighted sound level of 45dB(A) or more at the point of interest is objectionable, a level of 40dB(A) usually is tolerable, and a level of 35dB(A) usually acceptable.

3.6.14 From the guidance above it is recommended that each dwelling will have an external area which is designed to control substation noise levels to be no higher than 35dB(A).

3.6.15 The noise limit of 35 dB(A), stated above, corresponds approximately to a non-weighted 100Hz noise limit of 54dB.

3.7 Summary

3.7.1 The noise levels from local roads, the railway and the industrial noise sources shall be compared to the internal noise requirements stated within BS8233 in order to establish the suitability of the site.

3.7.2 Where low frequency noise from the substation is concerned the best guidance available is DEFRA NANR 45: Procedure for Assessment of Low Frequency Noise. This is because the standard adequately takes account of the impact of low frequency noise from the substation within the nearest residential dwellings.

3.7.3 Where external amenity areas are concerned the design goal in the case of general noise sources is to develop a noise control strategy to ensure that within each garden there is provision for an area subject to noise levels of 55 dB $L_{Aeq,\ 16h}$ or less. The corresponding design goal in the case of substation noise is to be 54 dB $L_{eq,\ 5min}$ as a non-weighted 100Hz centre frequency noise level.

4 Environmental Noise Survey

4.1 Methodology and Equipment

4.1.1 An unattended noise survey was conducted from Sunday 3rd February to Thursday 7th February 2013 in order to establish the existing noise levels at the site.

4.1.2 Noise monitors were setup at three positions as shown in attached site plan 13/0190/SP1 and described below:

- L1 – Free field measurement position located 1.5m above ground level in the northern most corner of the proposed residential area of the site. Noise levels at this position were dominated by road traffic noise from local roads and the maximum noise levels were affected by occasional trains. The trains were noted to generally be small 2-3 carriage commuter trains.

- L2 – Free field measurement position located 4m above ground level in the south eastern corner of the site. The measurement position was selected to be representative of the noise levels at the nearest proposed residential façade to the substation. Noise levels at this position were dominated by noise from the substation. Train pass-bys and road traffic noise were also audible at this position.

- L3 - Free field measurement positions located 1.5m above ground level in the southern boundary of the site. This position was selected to the representative of the nearest proposed residential façade to the industrial area located on the southern boundary of the site. Noise levels at this location were dominated by road traffic noise from local roads. Maximum noise levels from within the industrial area were also recorded.

4.1.3 Attended measurements were also taken over three consecutive 1 hour periods at MP1 during the day on the 7th February. This was a free field position located 1.5m above ground level in the north western corner of the site. Noise levels at this location were dominated by road traffic noise.

4.1.4 Additional short-term attended measurements were taken on the 7th February in a selection of free field locations, each at 1.5m above ground level as shown on attached site plan 13/0190/SP1. These were used to establish the noise impact of the electrical substations at various locations. Some of these were located close to the substation to establish the noise level generated by the substation. Others were located around logging position L2 and close to the southern boundary of the site where the nearest proposed facades are to be located.

4.1.5 All measurements were made in terms of L_{Aeq}, L_{Amax} and $L_{A90.}$ The attended and unattended measurements were made over 30 seconds and 15 minute periods respectively.

4.1.6 The instrumentation used for the noise measurements is detailed in table T3.

Item	Manufacturer	Type
Sound Level Analyser x2	Norsonic	140
Sound Level Analyser	Norsonic	118
Acoustic Calibrator	Norsonic	1251

T3 Equipment used during noise surveys.

4.1.7 The sound level analysers were fitted with windshields. Calibration was carried out before and after the survey and no significant drift was noted to have occurred.

4.1.8 Weather conditions when setting up the unattended noise monitors were dry, cold and overcast and with occasional high wind speeds. Publically available weather data obtained from www.wunderground.com shows that rain fell on Monday night and during the day on Tuesday.

4.1.9 Weather during the attended survey was dry and cool with clear skies and a light north-westerly breeze.

4.1.10 Due to the adverse weather conditions at the beginning of the survey the noise measurements results for use in the assessment have been taken from a 24 hour period starting from Wednesday 6th 2013.

4.2 Measurement Results

4.2.1 The noise climate, during the attended survey and when setting up the noise loggers, varies across the site. Road traffic noise, from local roads, is audible across the whole site with noise

levels in the south eastern corner being dominated by low frequency noise generated within the electrical substation.

4.2.2 Occasionally trains are audible across the site and bangs and thuds from the industrial area are audible to the south of the site.

4.2.3 Noise measurement results from logging positions L1-L3 are shown in attached time histories 13/0190/TH01-TH03 respectively.

4.2.4 The daytime and night time L_{Aeq} noise levels at each of the measurement positions during our noise survey are shown in the table below:

Location	Daytime 0700-2300, $L_{Aeq, 16h}$	Night time 2300-0700, $L_{Aeq, 8h}$
L1	55	49
L2	54	50
L3	54	49
MP1	53	-

T4 Day and night time L_{Aeq} measured noise levels

DEFRA NANR 45

4.2.5 Figure 13/0190/F1 shows the worst case third octave band spectrum of the substation compared to the steady day and night time DEFRA curves. It can be seen from the graph that the most significant tonal component occurs at 100 Hz. It should be noted that the noise levels shown on this figure correspond to the noise levels measured at a position directly adjacent to the substation and is therefore does not directly consider the acceptability of the substation noise on the proposed development. The measurement position used is shown on attached site plan 13/0190/SP2 indicated as a 100 Hz noise level of 76 dB.

4.2.6 The figure shows that the 100 Hz one-third octave band is entirely dominant and the others are insignificant in comparison. This is a typical characteristic of transformer noise. The DEFRA curves are included on this figure simply to illustrate that it is the 100 Hz band that is of importance in this case. The curves are intended to apply to internal noise levels within dwellings, not to this external measurement location close to the transformers.

4.2.7 The 100 Hz noise levels at the attended measurement positions are shown on attached site plan 13/0190/SP2. Observations onsite indicated that noise levels in the 100 Hz band vary significantly with location. The reduction in noise level with distance from the substation is not always as great as might be expected. This is likely to be due to constructive interference of the sound waves from the two transformers at the substation. Care was therefore taken to

undertake measurements at locations where such an effect was present, representing the worst cases. At many other locations, the apparent constructive interference was not present, leading to reduced noise levels. Furthermore at many other locations, apparent destructive interference was present, leading to dramatically reduced noise levels.

4.2.8 In order to ensure that our assessment is based on a worse case position we have based our calculations on measurements where constructive interference is present. This means that where new residential facades are built in locations where constructive interference is not present the noise levels will be lower than predicted.

5 BS8233 Assessment

5.1 Day Time

5.1.1 The measured noise levels across the site shown in table T4 in the noise measurement results section above shows that the noise levels within proposed worst case gardens across the site are below 55 dB $L_{Aeq,\ 16h.}$ The noise levels are therefore below the upper noise level stated within BS8233 and thus deemed to be acceptable.

5.1.2 The highest measured $L_{Amax,F}$ maximum noise levels that are typical of intermittent events during the day time are in the order of:

L1: 74 dB(A)
L2: 71 dB(A)
L3: 74 dB(A)

5.1.3 Outlying maximum noise levels which appear to be erroneous have been excluded from the above. These noise levels are clearly shown on the attached time histories.

5.1.4 Additional screening between the proposed gardens and the nearest noise sources will be provided by the proposed houses. It is expected that these will provide a minimum reduction of 5 dB. Due to this, noise levels within the majority of garden spaces are expected to be below 50 dB $L_{Aeq,\ 16h}$ with the highest maximum noise levels predicted from the measured levels to be between 66- 69 dB(A) L_{Amax} during the day time period.

5.1.5 Our predicted day time maximum levels are well below 82 dB $L_{Amax,}$ which is the night time external noise limit provided within revoked PPG24, details of which are provided within section 3.6.11, and so maximum noise levels are not considered to be a significant issue within garden spaces.

5.1.6 Day time noise levels of 35 dB $L_{Aeq,16h}$ within the proposed residential dwellings will be achievable with typical thermal double glazing and acoustically treated trickle vents. The full specification for the glazing and vents are provided within section 8 below.

5.2 Night Time

5.2.1 The free field $L_{Aeq, 8h}$ noise levels across the site at night as measured at the logging positions varies between 49-50 dB. A *'good'* internal ambient noise level is achievable using typical thermal double glazing. To reduce the need to open the windows alternative means of ventilation will also need to be provided. The full specification for the glazing and vents are provided within the section 8 below.

5.2.2 The highest measured $L_{Amax,F}$ maximum noise levels that are typical of intermittent events during the night time are in the order of:

L1: 64 dB(A)
L2: 67 dB(A)
L3: 64 dB(A)

5.2.3 The noise levels above exclude individual measured results that appear to be atypical compared to the other measured levels.

5.2.4 To control noise from the industrial area within proposed houses near to monitoring position L3 it will be necessary to increase the performance of the ventilation system. Details of the required vent performance are provided within section 8 below.

6 External Low Frequency Noise Level Assessment

6.1 Since the previous agreement with the Environmental Health department as to the required elements of the noise assessment, an additional request has been made by the department that low frequency noise levels within gardens be considered.

6.2 An indicative layout of the residences has been produced to demonstrate that the proposed garden criteria shown in paragraph 3.7.3 above can be achieved. The layout used in the assessment could be subject to change but any updated layout will be designed to achieve the required criteria in gardens.

6.3 In order to quantify the mitigation provided by the houses a computer based noise prediction program (Wölfel IMMI version 2011-1 Plus) has been used to determine the free field noise levels across the site, generated by the substation, with and without the houses. Within the model the houses have been modelled with 8m ridge heights and the garages between them are modelled at 3m high, boundary fences have been taken into account where appropriate. The heights of the houses have been provided by NLP Planning and are as set out in the design access statement.

6.4 The landform in the computer model has been based upon elevation information from the topographical survey map covering the site. It therefore takes into account the significant variation in topography across the site but not very localised variations. The height of the transformer noise sources above local ground level has also been taken into consideration in the development of the noise model.

6.5 The substation noise sources in the model are based on noise measurements undertaken onsite. Prediction of noise propagation from the substation is conducted in accordance with ISO 9613-2[2].

6.6 The model has been verified by checking the calculated noise levels at the measurement positions located on the proposed site against the measurements taken at those positions, this ensures that any mitigation present between the substation and the proposed development is taken into account. The worst case on site measurement positions (where constructive interference appears to be evident) have been used for this purpose, to ensure as robust an assessment as possible.

6.7 On the above basis, calculations have then been made of substation noise levels across the proposed residential area close to the substation with the proposed dwellings in place. This calculation area has been selected as it demonstrates a worst case assessment, being the closest area to the substation. These calculations have been undertaken at 1.5m above ground level to represent people sitting within garden spaces.

6.8 The calculations and assessments have been undertaken solely in the 100 Hz one-third octave band, since the detailed observations and measurements onsite indicate that this frequency is the dominant frequency generated by the substation.

6.9 Attached noise contour 13/0190/NC2 shows the difference between the 100 Hz noise level from the substation with and without the proposed dwellings. It can be seen from the figure that noise levels within the gardens are generally reduced by between 3-12 dB depending on the amount of screening present. This shows that a notable reduction in onsite noise levels can be achieved through careful design of the proposed site layout.

6.10 The noise limit of 35 dB(A), stated in paragraph 3.6.14, corresponds approximately to a non-weighted 100Hz noise limit of 54 dB.

6.11 The calculated, non-weighted noise levels, at 100Hz, within gardens with the proposed dwellings in place are shown in attached noise contour 13/0190/NC1.

6.12 It can be seen from the noise contour that the 100Hz noise limit is achieved within all gardens.

6.13 The calculated noise levels show that acceptable external noise levels from substation noise can be achieved within gardens through careful planning of the locations of proposed gardens compared to the dwellings.

[2] ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation.

7 Internal Low Frequency Noise Assessment

7.1 Assessment

7.1.1 The highest 100 Hz one-third octave band noise level measured in line with the proposed residential facades has been used within our assessment to ensure a worst case assessment. The calculations and assessments have been undertaken solely in the 100 Hz one-third octave band, since the detailed observations and measurements onsite indicate that this frequency is entirely dominant and others are insignificant in comparison.

7.1.2 The highest 100 Hz noise level at the nearest proposed façade is 63 dB.

7.1.3 An assessment of noise break-in has been carried out against the DEFRA low frequency noise curves, as discussed in section 3.5 above and contained in the attached Appendix A.

7.1.4 The assessment considers noise within dwellings and has been used to specify glazing requirements in order to avoid breaching the DEFRA curve.

7.1.5 It is assumed that the proposed dwellings will be of cavity masonry construction. Taking this into account our, calculations show that the glazing to rooms which have an "acoustic view" of the transformers must have a sound reduction performance as below;

- **24 dB at 100Hz 1/3 octave band centre frequency, as installed**

7.1.6 This can be achieved by installing high performance thermal double glazing with a sound reduction performance as outlined for Type 2 in Table 5 with the additional requirement at 100Hz 1/3 octave centre frequency as outlined above. Although we would expect that a window system achieving R_w 45 dB (which is readily available) to achieve this performance requirement; it is essential that laboratory acoustic test evidence is provided for the selected glazing and frame configuration in its complete condition, including any integral trickle vents, to verify the required performance can be achieved. Reputable glazing suppliers would be expected to have already had their products tested as required and have this data readily available. As such the data and its provision should not be seen as a particularly onerous requirement.

7.1.7 The exact locations and performance of the higher rated glazing will need to be checked when the housing layout master plan has been fully developed.

7.1.8 To minimise the need to open habitable room windows, alternative means of ventilation should be provided. The requirements for the passive ventilation system are provided in section 8.

7.1.9 The layout of the proposed houses will have a large effect on the impact from the electrical substation. Where possible habitable rooms should be placed on the façade facing away from the substation. However where it is necessary to place windows in elevations facing the substation, it has been demonstrated above that suitable internal noise levels can be met with appropriate glazing and ventilation.

7.2 Room Modes

Mechanism

7.2.1 The phenomenon of room modes is a complex one, which has the potential to affect noise levels within any room in a dwelling.

7.2.2 Room modes arise when unobstructed sound waves reflecting off room surfaces interact with each other. The interaction of the waves can give rise to sound levels that differ substantially from those in the absence of the particular room mode that may be evident. This effect works both ways, with sound levels at some locations potentially being higher and some lower than those in the absence of the mode.

7.2.3 The presence of room modes and the frequencies at which they occur is dependent upon the dimensions of the space and the materials in it.

Axial Modes

7.2.4 The simplest room modes are axial modes, which can occur when sound waves reflecting perpendicularly off two parallel and opposite surfaces interact.

7.2.5 Axial modes are the strongest of the mode types and are therefore of primary concern.

Tangential Modes

7.2.6 Tangential modes can occur when sound waves reflecting off four room surfaces interact. Tangential modes are weaker than axial modes and are therefore of less concern.

Oblique modes

7.2.7 Oblique modes can occur when sound waves reflecting off all six surfaces in a room interact. These are the weakest of the three types of room mode and are therefore of least concern.

Room Mode Control by Design

7.2.8 It will be necessary to control room modes by careful design of those **rooms with an 'acoustic view' of the substation** This will be done by ensuring that the dimensions of the rooms closest to the substation will not give rise to significant modes at 100 Hz.

7.2.9 Limiting the potential for significant modes at 100 Hz to occur within rooms is achievable by avoiding specific room dimensions during design. This should not be too restrictive and subject to it being appropriately considered should be relatively simple to incorporate. To aid in the selection of suitable room dimensions it will be necessary to avoid parallel wall to wall and floor to ceiling room dimensions which are multiples of 1.70m±0.05m (eg 3.40m±0.10m or 6.80m±0.20m etc.)

7.2.10 A full assessment of room modes can be relatively easily be undertaken when the design of the proposed rooms is advanced to a stage where the exact room dimensions and locations are known.

8 Required Mitigation

8.1 An overview of the required mitigation which will need to be installed at the site is provided below. This is based on the BS8233 and DEFRA NANR 45 assessments detailed in sections 5 and 6 above.

8.2 The following table details the minimum sound reduction requirements of all the glazing within the proposed development. The requirements have been based on typical room dimensions and a cavity masonry façade construction:

Glazing Type	**Sound Reduction Index at Octave Band Centre Frequency (Hz)**				
	125	**250**	**500**	**1k**	**2k**
Glazing Type 1 (Typical of 6/16/4mm glazing)	22	22	28	39	39
Glazing Type 2* (Typical of R_W 45 glazing)	24	22	28	39	39

T5 Recommended standard and higher performance glazing insertion losses

***In addition** to the octave band requirements shown in the table the manufacturer/supplier must demonstrate that the system as a whole achieves a minimum sound reduction of 24 dB at 100 Hz 1/3 octave band centre frequency.

- Glazing Type 1 is to be installed within all facades which have a minimum of line of sight screening to the substation. This screening is to be provided by other houses within the development.
- Glazing Type 2 is to be installed within all facades which are unscreened from the substation.

8.3 It is essential that any certified laboratory glazing test data is provided for the selected glazing in its complete condition so that compliance with the acoustic performance specification of the proposed system can be unequivocally demonstrated. Reputable glazing suppliers would be expected to have their high performance products tested and have this data readily available. As such the data and its provision should not be seen as a particularly onerous requirement.

8.4 It will also be necessary to include acoustically attenuated passive ventilation in order to achieve suitable ventilation rates along with the internal noise levels. The required performance of all vents are shown in the table below:

Ventilation Type	$D_{n,e}$ at Octave Band Centre Frequency (Hz)				
	125	250	500	1k	2k
Ventilation Type A (Passivent Fresh 100 dB)	40	38	39	41	50
Ventilation Type B (Typical of $D_{n,e,w}$ 31 dB vents)	19	22	25	33	41

T6 Recommended ventilation losses

- Ventilation Type A is to be installed to ventilate rooms which are unscreened from either the industrial area on the eastern boundary of the site or the electrical substation.
- Ventilation Type B is to be installed to ventilate all other rooms.

8.5 Details of the types of ventilation systems which can be used to meet the above losses are shown in attached Appendix B. These types of ventilation systems are regularly used for new build residential schemes where a degree of sound reduction is required, this is often in areas where new residential facades will overlook existing roads. If required these vents can be used as part of a whole house ventilation system to increase the airflow provided.

9 Planning Conditions

9.1 The local planning authority may consider it necessary to condition any planning permission that is granted. It is worth noting that DOE Circular 1/85 contains guidance on use of conditions. The guidance has since been updated in Circular 11/95. It indicates that conditions should only be imposed if they are:

- Necessary
- Relevant to planning
- Relevant to the development to be permitted
- Enforceable
- Precise
- Reasonable in all other respects

9.2 The guidance also states that conditions should be fair and practicable and that:

"The use of conditions in an unreasonable way … so that it proves impracticable or inexpedient to enforce them … should be avoided."

9.3 The guidance also states:

"In some cases a condition is clearly unnecessary, such as where it would repeat provisions in another condition imposed on the same permission."

9.4 Taking account of the above, we set out below our suggested wording for a suitable planning condition to control electrical substation noise.

Internal Noise

"The development hereby permitted shall not commence until a detailed scheme has been submitted to and approved by the local planning authority in writing in order to mitigate the impact of low frequency noise from the electrical substation shown […] on plan […] upon noise levels within the dwellings hereby permitted. The scheme shall broadly accord with the Cole Jarman Planning Noise Assessment submitted as part of the application dated 13 June 2013 (Report 13/0190/R1 Revision 6) and shall:

a) demonstrate that internal noise levels at the 100Hz one-third octave band centre frequency shall not exceed an unweighted 48 dB $L_{eq,5\ min}$ during the day (0700-2300h) and 43 dB $L_{eq,5\ min}$ at night (2300-0700h) respectively at any location within the dwellings due to the operation of the electrical substation; and

b) shall include specifications for the installed performance of external building fabric such as windows and include the provision of alternative means of background ventilation in order to achieve the noise levels set out in (a) above.

The development shall be carried out in accordance with the approved scheme (unless otherwise agreed in writing by the Local Planning Authority)

9.5 This planning condition aims to ensure that suitable internal noise levels, from substation noise, are achieved within the proposed dwellings.

External Noise

"The development hereby permitted shall not commence until a detailed scheme has been submitted and approved by the local planning authority in writing in order to mitigate the impact of low frequency noise from the electrical substation shown […] on plan […] upon noise levels within the gardens of the dwellings hereby permitted. The scheme shall broadly accord with the Cole Jarman Planning Noise Assessment submitted as part of the application dated 13 June 2013 (Report 13/0190/R1 Revision 6) and shall demonstrate that within each garden there is provision for an area subject to noise levels at the 100Hz one-third octave band centre frequency shall not exceed an unweighted 54 dB $L_{eq,5\ min}$ due to the operation of the electrical substation.

The development shall be carried out in accordance with the approved scheme (unless otherwise agreed in writing by the Local Planning Authority).

10 Conclusion

10.1 It is proposed to develop the land at Dearne Hall Road, Barnsley into a new residential development. The site is located next to an existing electrical substation, an industrial estate, a railway line and local roads. This report has shown that the site is suitable for development for residential use in relation to the existing noise levels at the site.

10.2 An outline of the guidance which has been used to establish external and internal noise limits from local noise sources has been provided within this report. Guidance on Low frequency noise from the substation has also been provided.

10.3 The report has shown that suitable internal noise levels can be achieved in all of the proposed residential dwellings using a mixture of typical thermal double glazing and high performance sound insulating double glazing, with acoustically treated trickle ventilation to reduce the requirements to open windows.

10.4 With the specified glazing and trickle vents installed noise levels within the proposed residences will be controlled to within suitable levels on all parts of the proposed development area on the site.

10.5 Noise levels within gardens have been assessed within this report and it has been shown that suitable noise levels can be achieved through suitable layout of the scheme.

10.6 Noise from the electrical substation is taken into account in the various assessments and mitigation described above. Specific analyses have been undertaken of noise levels due to this source, as effecting both internal noise levels in proposed dwellings and external noise levels in proposed gardens. The assessment has been conducted very much on a worst case basis and consequently at many locations noise levels are likely to be lower than predicted herein. Even on this worst case basis though, the predicted internal and external noise levels are acceptable when compared with suitable guidelines. Therefore electrical substation noise cannot constitute a reason to refuse planning permission.

End of Section

Cole Jarman

Figure 13/0190/SP1

Title:

Site plan showing noise monitoring positions

L# Long Term Monitoring Position

MP# Attended Position

Project:

Dearne Hall Road, Barnsley

Date: March 2013

Revision: 2

Scale: Not to scale

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Cole Jarman

Figure 13/0190/SP2

Title:

Site plan showing 100Hz attended noise measurement results

dB Measured 100Hz level

Project:

Dearne Hall Road, Barnsley

Date: March 2013

Revision: 2

Scale: Not to scale

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Noise Survey Results

Measurement Position MP1

Period	L_{Aeq}	L_{Amax}	L_{A90}
07/02/2013 10:15	54	69	50
07/02/2013 10:30	54	69	50
07/02/2013 10:45	53	68	50
07/02/2013 11:00	54	70	49
07/02/2013 11:15	52	65	50
07/02/2013 11:30	52	62	49
07/02/2013 11:45	55	71	50
07/02/2013 12:00	56	76	50
07/02/2013 12:15	54	71	51
07/02/2013 12:30	52	62	50
07/02/2013 12:45	52	65	50

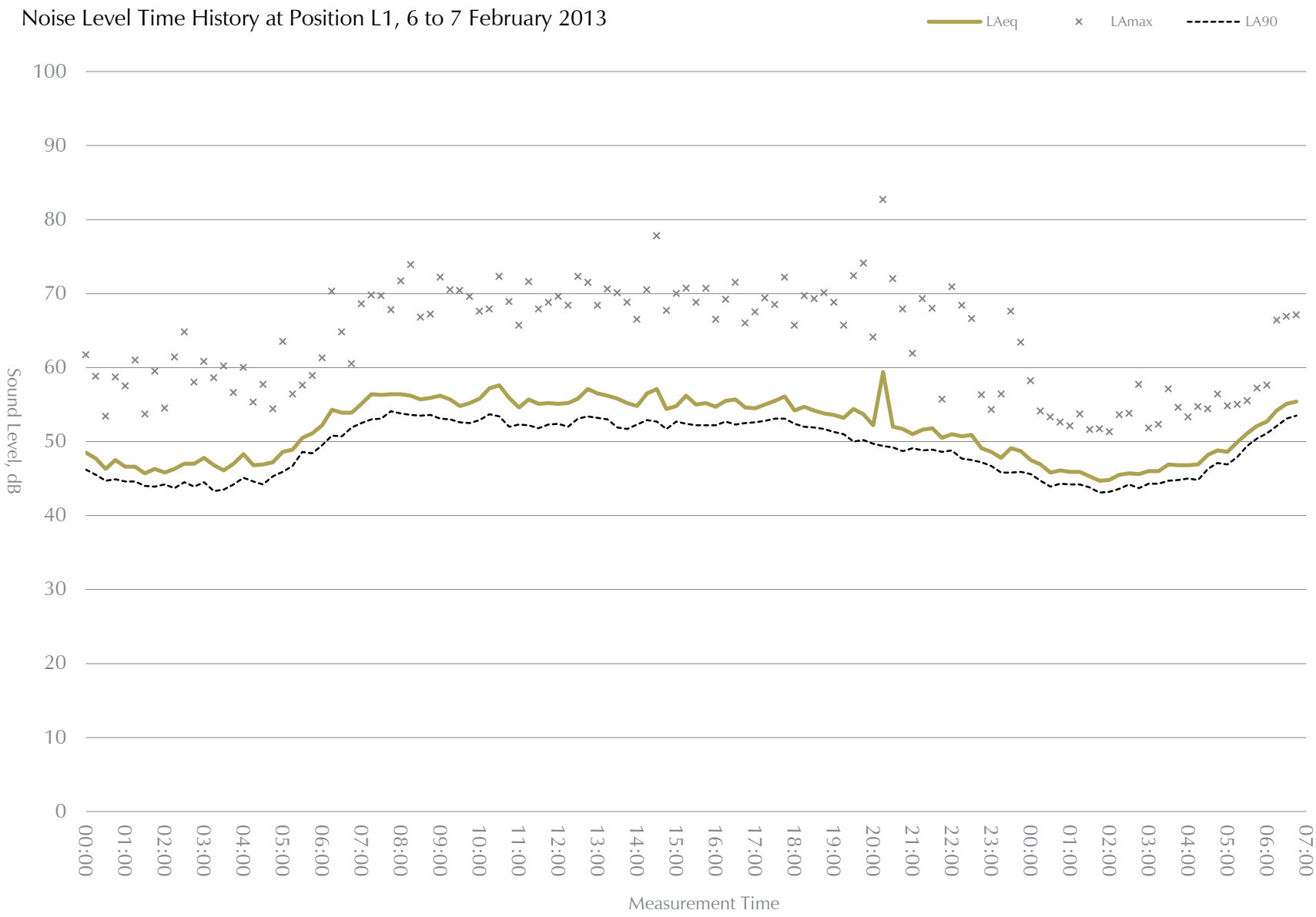


Figure 13/0190/TH01

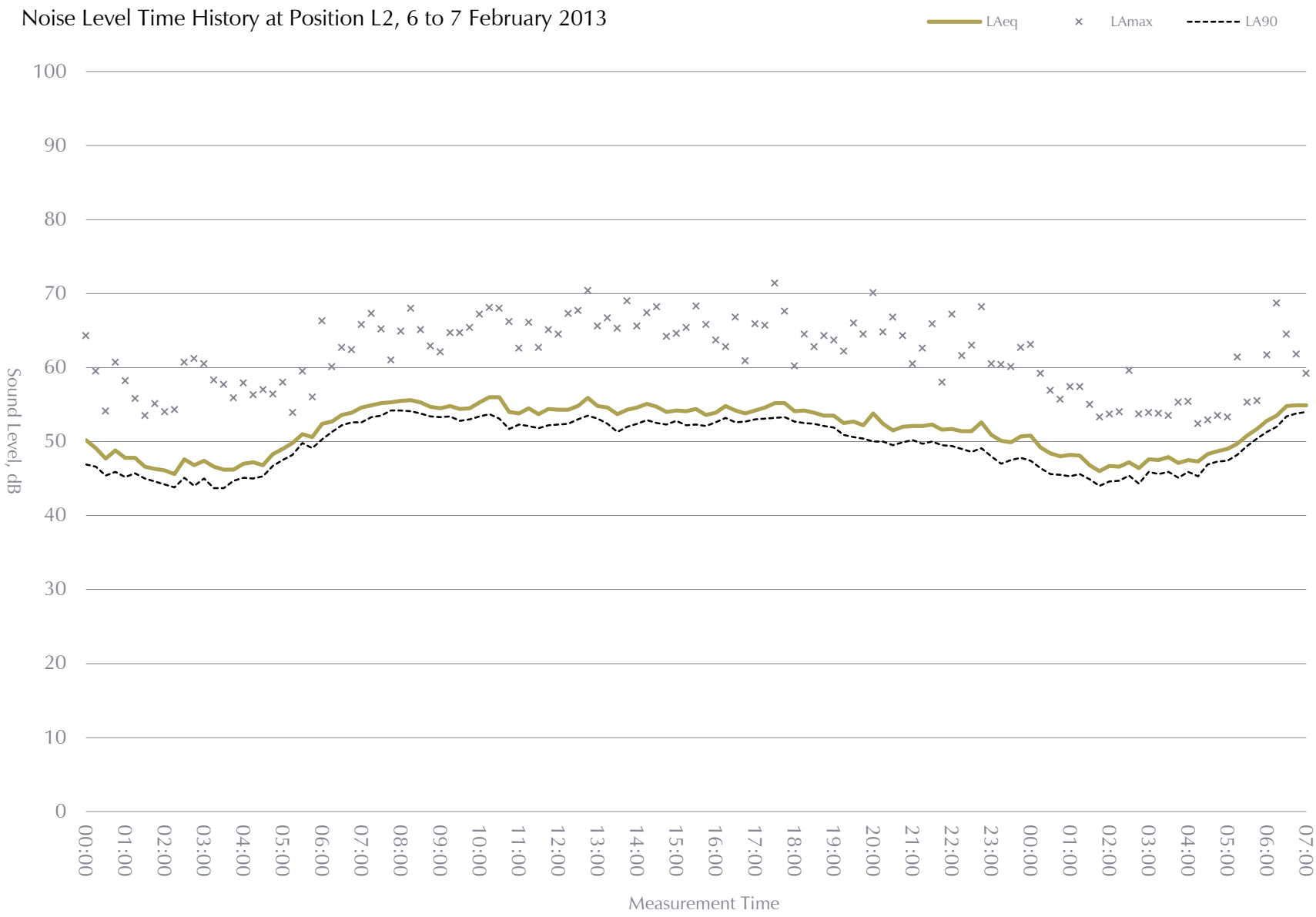


Figure 13/0190/TH02

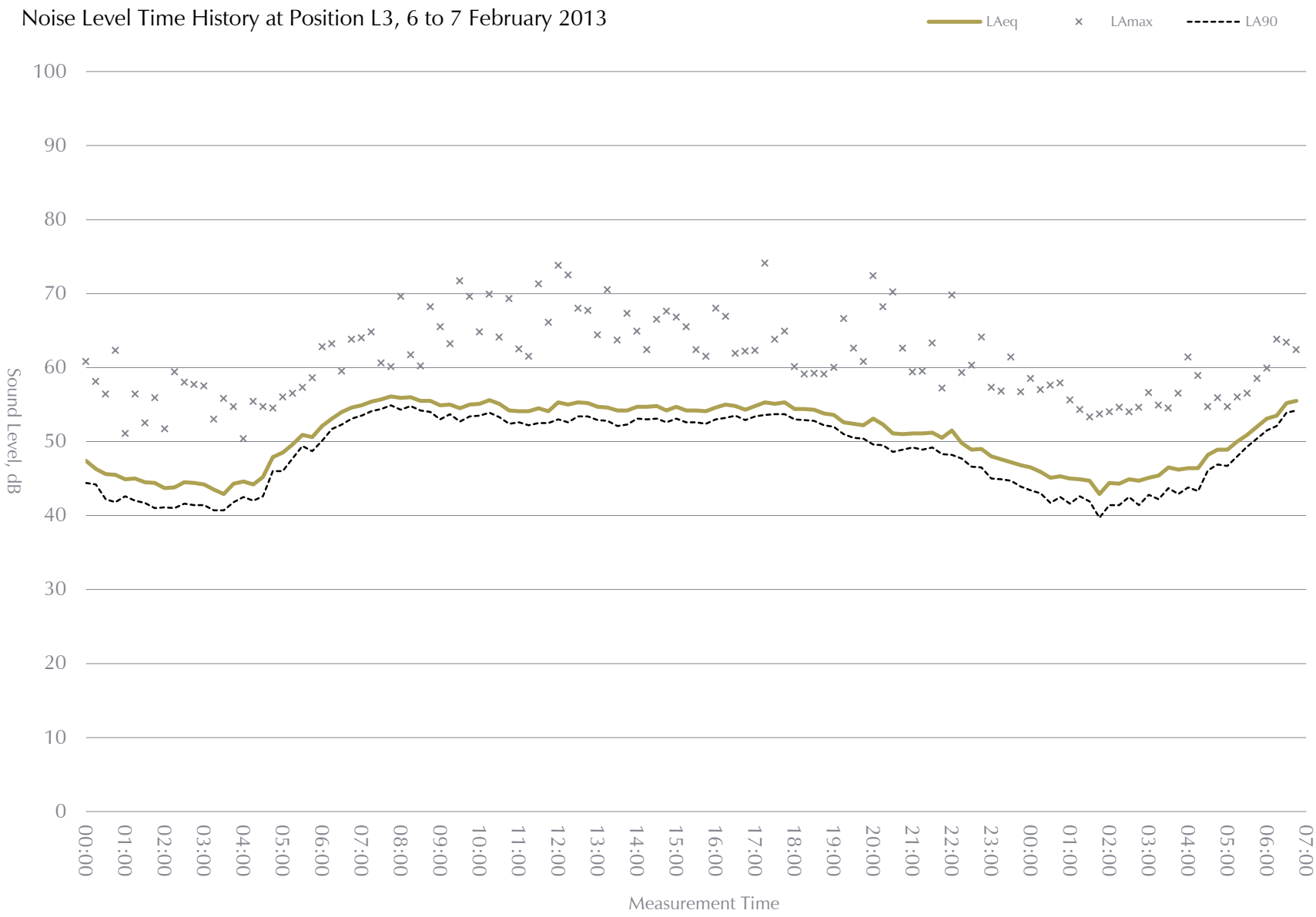


Figure 13/0190/TH03

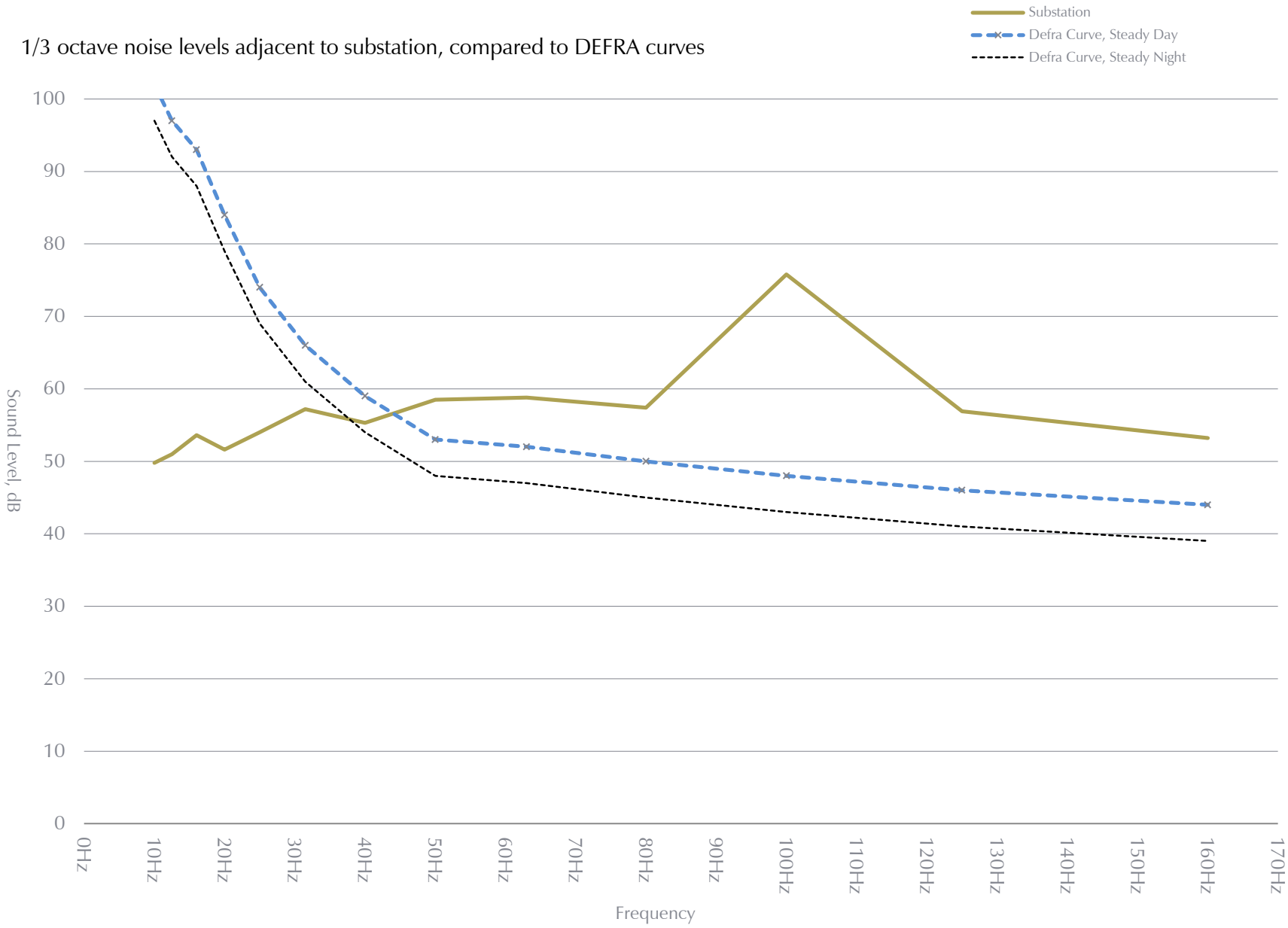
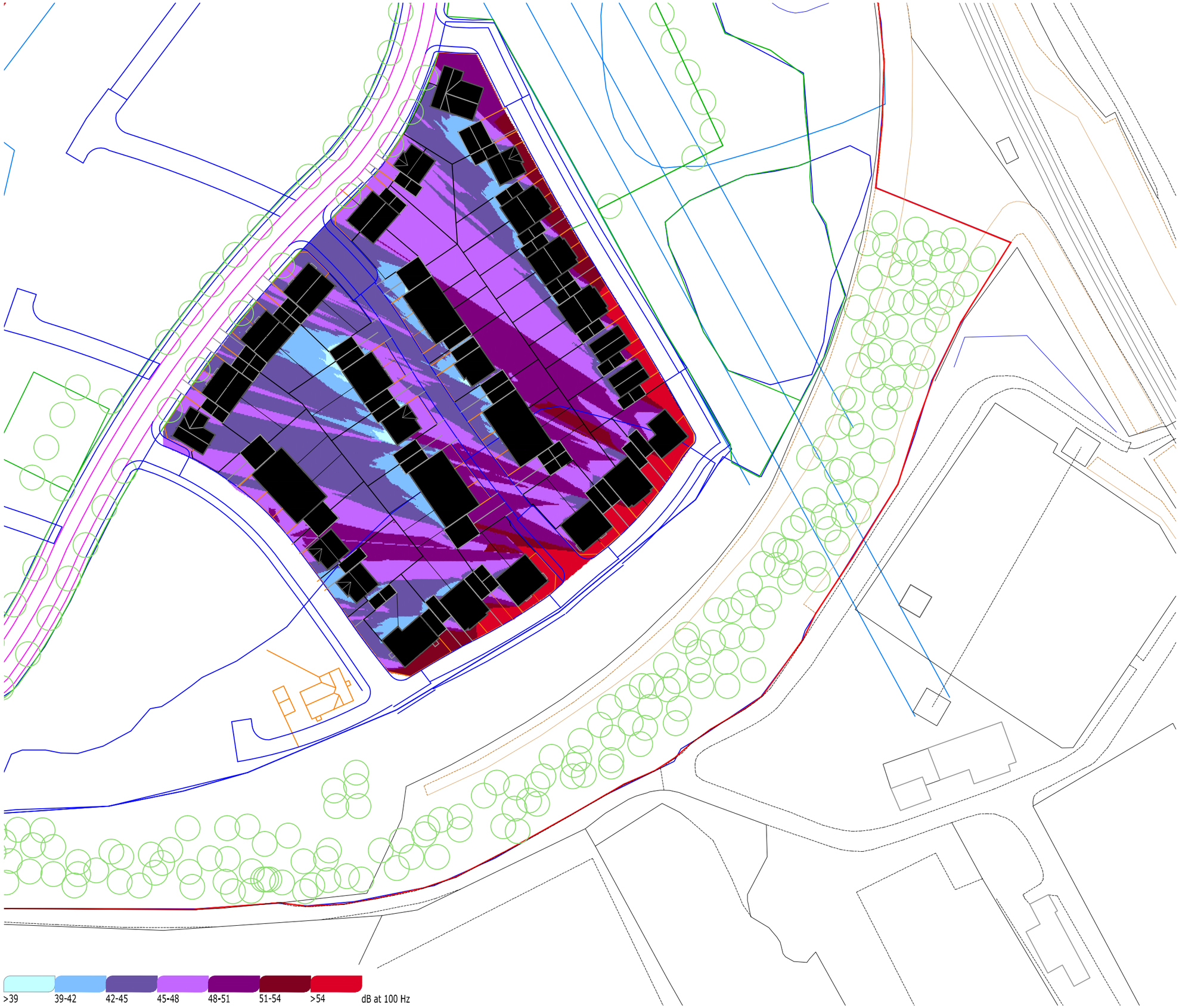


Figure 13/0190/F1



Cole Jarman

Figure 13/0190/NC1-1

Title:

Noise contour showing the calculated 100 Hz substation noise levels across the site with the proposed dwellings.

This is for comparison with the advised garden noise limit of 54dB at 100Hz from the substation.

Project:

Dearne Hall Road, Barnsley

Date:

May 2013

Scale:

Not to scale

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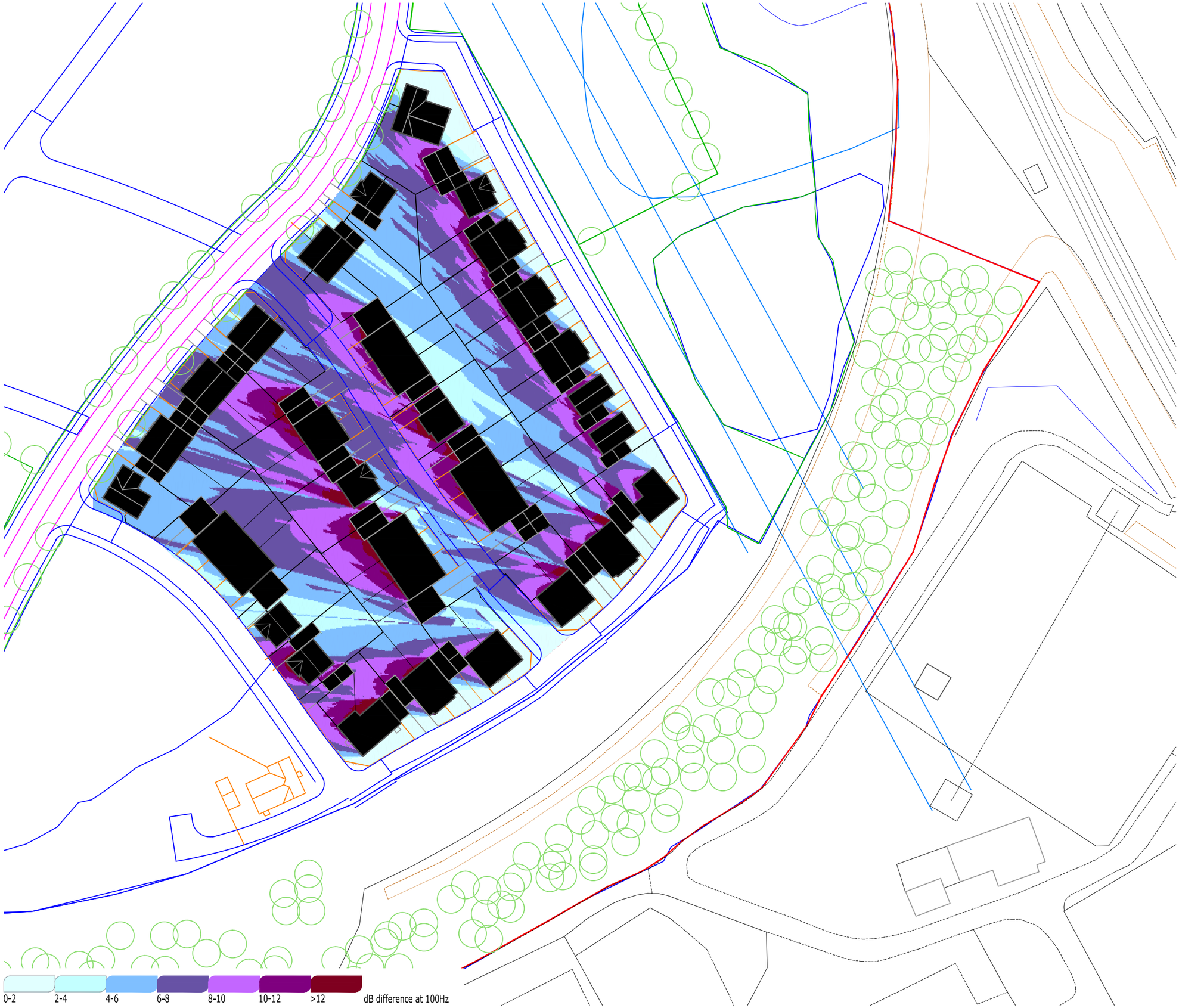

Cole Jarman

Figure 13/0190/NC2-1

Title:

Noise contour showing the difference in 100 Hz substation noise levels with and without the proposed development

Project:

Dearne Hall Road, Barnsley

Date:

May 2013

Scale:

Not to scale

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Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_{n}.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

Acoustic View

A receiver which has an "acoustic view" of a noise source is one where there is no acoustical screening between the source and receiver.

Appendix A

Subject:	**DEFRA NANR 45:** **Procedure for the assessment of low frequency noise complaints**
Project:	**Dearne Hall Road, Barnsley**
Date:	**February 2013**

A1 Objective and Scope

A1.1 The DEFRA *Procedure for the Assessment of Low Frequency Noise Complaints* (with contract reference NANR45) is intended to aid the evaluation of existing cases by determining whether a low frequency environmental noise exists that could be the cause of complaints.

A1.2 The document makes clear that the procedure set out is not intended as a means of predicting when disturbance might occur. It states that the procedure would not be reliable if used in such contexts, for example at the planning stage.

A1.3 The procedure is not intended to provide a prescriptive indicator of nuisance.

A1.4 Also excluded from the scope of the procedure is the assessment of noise from traffic and from entertainment.

A1.5 The procedural document was published in February 2005 and refers to a larger NANR 45 document entitled *Proposed Criteria for the Assessment of Low Frequency Noise Disturbance*, which was published shortly beforehand.

A1.6 It also refers to a Review of Published Research on Low Frequency Noise and its Effects carried out for DEFRA and published in May 2003.

A2 Assessment Basis

A2.1 The procedural document presents a criterion curve, against which measured environmental noise can be assessed in terms of L_{eq}. The document states that if the noise occurs during the day only then a 5 dB relaxation may be applied to the criterion at each 1/3-octave band centre frequency. The criterion curve for each of the day and night periods are set out in the table below.

Period	One Third Octave Band Centre Frequency (Hz)												
	10	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Night	92	87	83	74	64	56	49	43	42	40	38	36	34
Day	97	82	88	79	69	61	54	48	47	45	43	41	39

BT1 Criteria for fluctuating sounds

A2.2 The procedure indicates that a noise with an L_{eq} exceeding the criterion at any 1/3-octave band centre frequency has the potential to give rise to complaints (but will not necessarily do so). The intention is then that the measured time variation of the L_{eq} is plotted for the 1/3-octave band which exceeds the criterion curve by the greatest margin.

A2.3 The document also states that the criterion curve should be relaxed by 5 dB for steady sounds, to take account of the fact that such sounds are usually less disturbing than those that vary with time. The larger research document (*Proposed Criteria for the Assessment of Low Frequency Noise Disturbance)* defines a steady sound as one exhibiting either of the following characteristics in the 1/3-octave band which exceeds the reference curve values by the greatest margin:

- a difference of less than 5 dB between the L_{10} and L_{90} parameters relating to that sound; or
- the rate of change of sound pressure level (fast time weighting) is less than 10 dB per second.

A2.4 Based upon the above we set out criterion curves for steady sounds in the table below.

Period	One Third Octave Band Centre Frequency (Hz)												
	10	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
Night	97	82	88	79	69	61	54	48	47	45	43	41	39
Day	102	97	93	84	74	66	59	53	52	50	48	46	44

BT2 Criteria for steady sounds

End of Section

Appendix B

Subject: **Acoustically rated alternative means of ventilation**
Project: **Dearne Hall Road, Barnsley**
Date: **June 2013**

B1 Introduction

This appendix sets out products and suppliers of acoustically treated means of ventilation alternative to open windows for residential applications. Products are grouped to achieve low, medium or high levels of passive acoustic attenuation, with additional details for mechanical ventilation systems. Supplier contact details are provided in the final section B6.

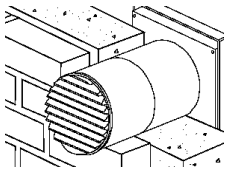
The $D_{n,e,w}$ value specifies the acoustic reduction of a vent, based on its area, standardised to an absorption area of $10m^2$. Therefore the figure is higher than the actual insertion loss that will be provided by the ventilator, as it is dependent on the area of the vent. The $D_{n,e,w}$ figure is only therefore useful in specifying the product against a given $D_{n,e,w}$ requirement. The acoustician should review the selected products, based on the test data provided by the manufacturer, to make sure the required performance will be achieved. Laboratory tests to conform with BS EN 140-10, 1992, ISO 140-10, 1991 – Laboratory measurement of airborne sound insulation of small building elements, and then rated in accordance with EN 717-1.

The data supplied here is based on manufacturer data, and will need to be confirmed by accredited laboratory test reports. These suggestions are intended to provide an indication of the type of products available, and it is recommended to be used on only as a guide, where similar products by other manufacturers may offer equivalent alternatives.

B2 Low Attenuation

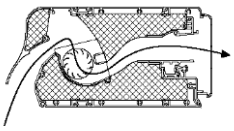
The following products are suitable for low attenuation requirements ($D_{n,e,w}$ up to 40dB).

B2.1 **Rytons, 125mm Acoustic High Rise Aircore, AAH5HM**



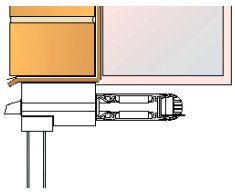
- $D_{n,e,w}$ 38dB
- Equivalent 3248 mm^2 free area

B2.2 **Renson, Sonovent V**



- $D_{n,e,w}$ 38 - 43dB
- Hybrid system using a forced ventilation of 220 $m^3/h/m$

B2.3 **Passivent, TVALdB, 450/40**



- $D_{n,e,w}$ 40dB
- Equivalent 4200 mm^2 free area

B3 Medium Attenuation

The following products are suitable for medium attenuation requirements ($D_{n,e,w}$ 41 – 49dB).

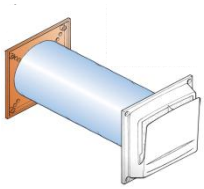
B3.1 **Rytons, 125mm Acoustic High Rise Aircore, AAC5**

- $D_{n,e,w}$ 41dB
- Equivalent 3970 mm^2 free area

B3.2 **Passivent, 800/42**

- $D_{n,e,w}$ 42dB
- Equivalent 4200 mm^2 free area

B3.3 **Passivent, Fresh TLF-dB**



- $D_{n,e,w}$ 44dB
- Equivalent 5000 mm^2 free area

B3.4 **Passivent, Fresh 90dB**

- $D_{n,e,w}$ 45dB
- Equivalent 6000 mm^2 free area

B3.5 **Greenwood Airvac, AAF**

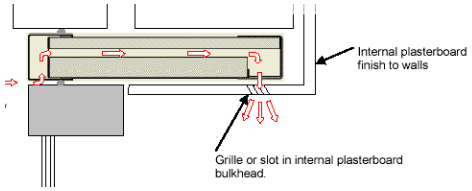
- $D_{n,e,w}$ 43dB

B4 High Attenuation

The following products are suitable for high attenuation requirements ($D_{n,e,w}$ up to 60dB).

B4.1 **CAICE, Acoustic Ventilator**

- $D_{n,e,w}$ 50dB
- Equivalent 6000 mm^2 free area



B4.2 **Renson : Sonovent or Invisivent, AK49**

- $D_{n,e,w}$ 40 - 56dB available
- E.g. Sonovent = $D_{n,e,w}$ 56dB in open position for an (X-Large); 10 mm air slot and air volume up to 42 m^3/h/m

B4.3 **Passivent, Fresh 80dB**

- $D_{n,e,w}$ 50dB
- Equivalent 4000 mm^2 free area

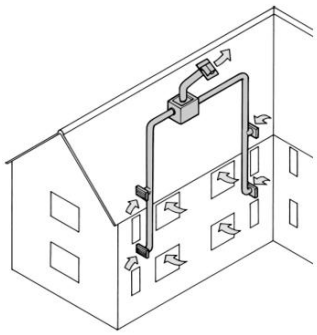
B4.4 **Greenwood Airvac, MA3051**

- $D_{n,e,w}$ 55dB
- Equivalent 2500 mm^2 free area

B5 Mechanical System

B5.1 **Passivent AV+**

- This is an example of a whole house type ventilation system, with a centralised extract fan.
- Such a system would typically utilise passive vents in the building façade, such as Passivent Fresh 80 vents set out above.



B6 Supplier Contact Details

B6.1 **Rytons Building Products**

- Telephone +44 (0) 1536 511874
- www.vents.co.uk

B6.2 **Renson Ltd**

- Telephone +32 (0)56 627111 (Belgium)
- www.renson.net

B6.3 **Passivent Ltd**

- Telephone +44 (0) 161 9627113
- www.passivent.com

B6.4 **Greenwood Air Management Ltd**

- Telephone +44 (0) 1903 771021
- www.greenwood.co.uk

B6.5 **Caice UK Ltd**

- Telephone +44 (0)844 8475370
- www.caice.co.uk

End of Section

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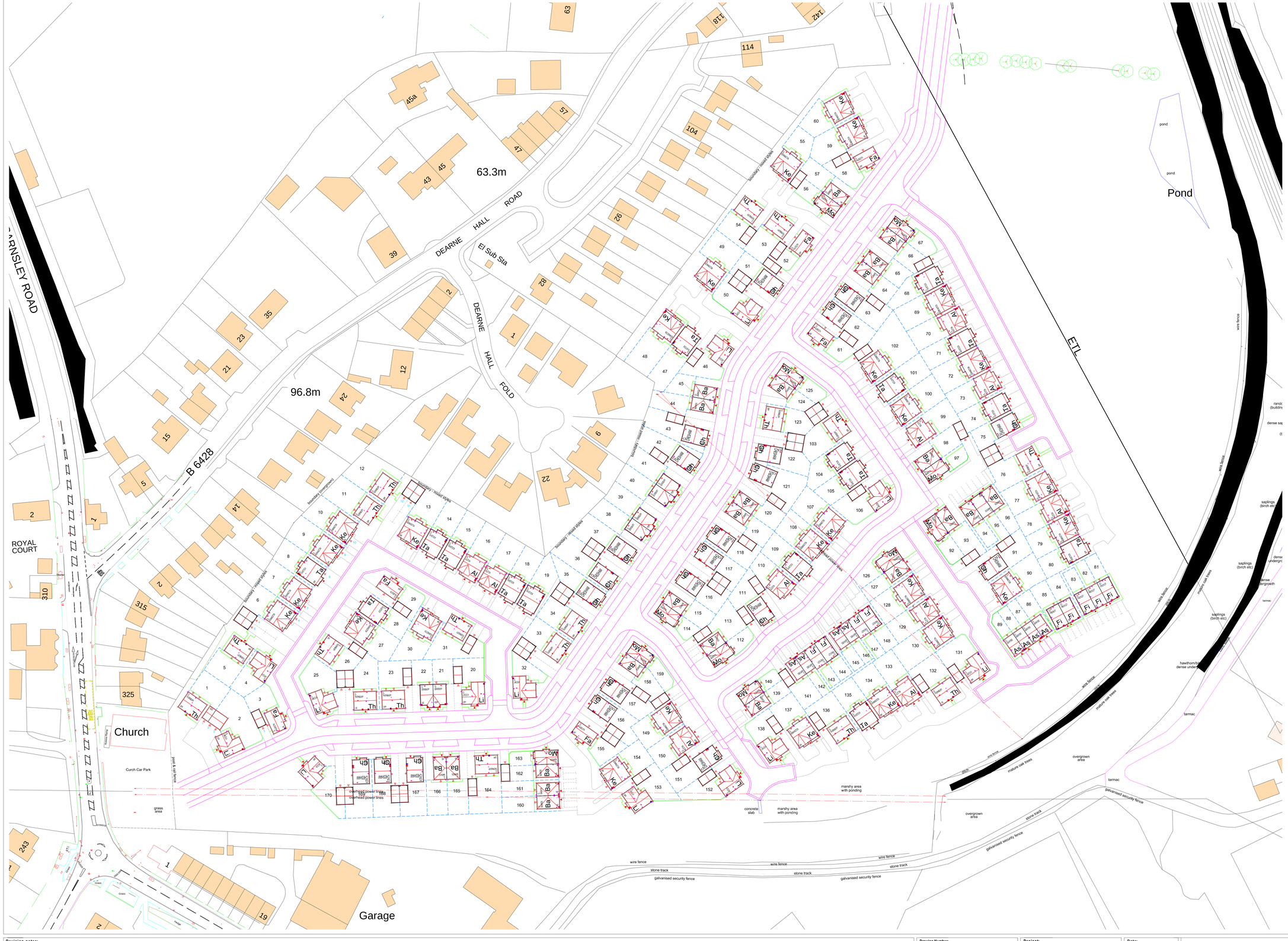
Appendix B

LOWER BARUGH, BARNSLEY



Revision notes:

Rev:	Date:	Notes:
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Drawing Number: --

Client: Barratt Homes Yorkshire West Region

Project: Lower Barugh Barnsley

Drawing Title: Site Plan

PRELIMINARY

Date: Oct 21

Scale: 1:500

Revision: --

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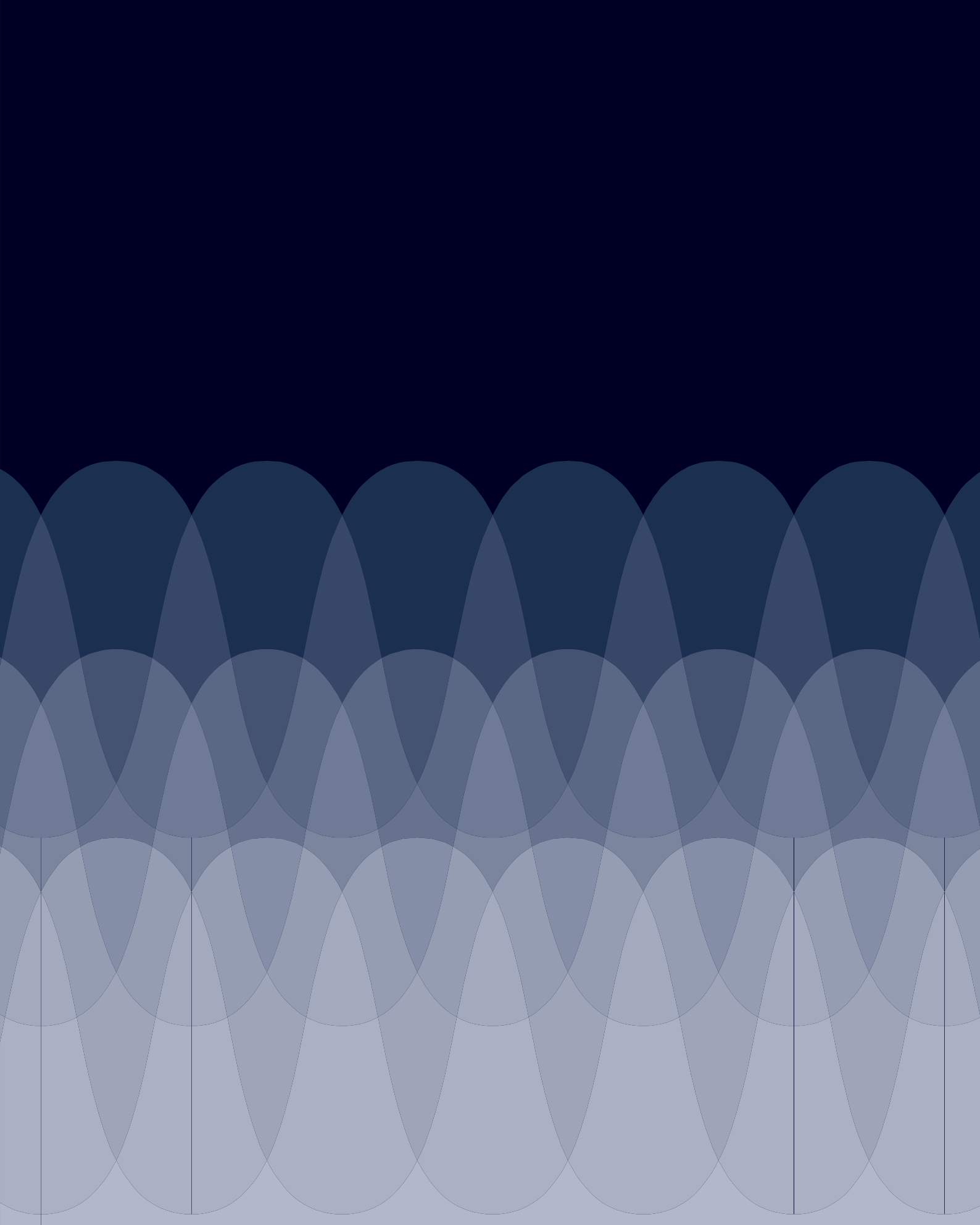

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